City of San Diego
2005 MSCP Rare Plant Monitoring Report

City of San Diego
Planning Department
Multiple Species Conservation Program Division

February 2006

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Acanthomintha ilicifolia (San Diego Thornmint)

Introduction

The MSCP Biological Monitoring Plan (1996) does not specify any San Diego Thornmint (*Acanthomintha ilicifolia;* Thornmint*)* monitoring locations within the City of San Diego; however, several sites have been monitored since MSCP inception and Citywide rare plant surveys in 2001. All Thornmint monitoring within the City was performed by volunteers in 2005.

Results

Site	Lead Monitor/s	Date	Method*	Result
Black Mountain Ranch	Mike Kelly	April 16, 2005	Census	120 Plants
Mission Trails	Mike Kelly	April 20, 2005	Census	120 Plants
Penasquitos Canyon	Mike Kelly	April 13, 2005	Census	2,091 Plants
Sabre Springs	Mike Kelly	April, 2005	Census	13 Plants

*Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

Analysis

Plant populations from 2000-2005 were examined and correlated with water year rainfall using Microsoft Excel. The Penasquitos Canyon Thornmint population exhibits a strong positive correlation with rainfall ($r = 0.9042$; $P < 0.05$; Figure 1). However, other sites do not show a similar correlation (Figures 2-4).

The most notable lack of rainfall correlation and population decline occurs at Sabre Springs, where only 13 plants were censused in 2005 as compared to 17,085 in 2004. Low numbers were also reported in 2002 (250 plants) at the site, however this may be partially explained by the extremely low rainfall in 2002 (3.44”). Mike Kelly, who surveyed all populations, reported that there appeared to be a die-off at the site during the growing season. He estimated that there were several thousand individuals at the Sabre Springs site three to four weeks prior to formal 2005 surveys. Then, when nearby populations were flowering, only 13 plants could be located at the Sabre Springs site. Possible explanations for the population crash are snail herbivory, herbicide damage, the Santa Ana heat wave, or competition. A heavy infestation of exotic snails was noted at the site in March, a phenomenon not previously noted. The prevalence of *Anagallis arvensis* (Scarlet pimpernel), a non-native invasive was also noted at the site. (Mike Kelly, personal communication via email, April 9, 2005).

At the Mission Trails site, 120 plants were censused. The population was lower in 2005 than both 2003 and 2001 (296 and 354, respectively), which were lower rainfall years (Figure 3). This site has been weeded by Mike Kelly for four years and burned in the Cedar Fire in Fall 2003. With weed removal and abundant rainfall, native Common Tarplant (*Deinandra fasciculata*) was abundant at the site in 2005 (estimated cover 95%). Shade from the Tarplant may affect the local Thornmint population. Additionally, non-native annual grasses, mustard (*Brassica* sp.), and Tocolote (*Centaurea melitensis*) are present at the site and may be causing

competitive pressure on Thornmint. Based on greenhouse competition experiments between Tocolote and Thornmint by Ellen Bauder, this non-native invasive species can negatively impact Thornmint (Mike Kelly, personal communication via email, 4/9/2005).

There were also relatively low numbers of Thornmint at Black Mountain Ranch (Figure 2), where 120 plants were censused in 2005; the plant numbers at this site have fluctuated between zero and 1,115 since first being surveyed in 2000. The low 2005 count was similar to the 105 count in 2004 and may be a normal population fluctation; however, based on the positive rainfall/Thornmint correlation that exists at the City's largest population in Penasquitos Canyon, the lower numbers in 2005 warrants careful watch.

Figure 1. *Acanthomintha ilicifolia* at Penasquitos Canyon and Annual Rainfall, 2000-2005

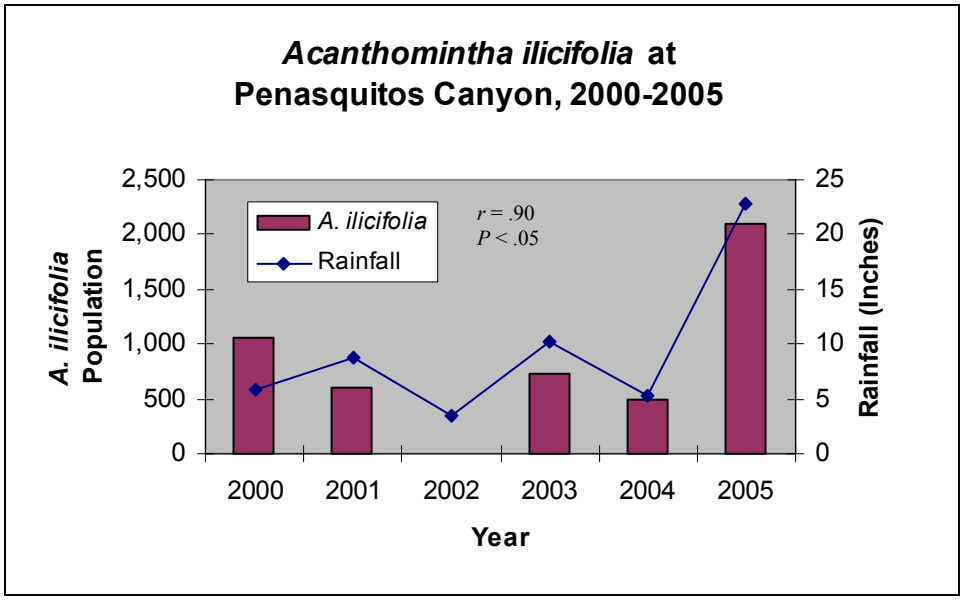


Figure 2. ***Acanthomintha ilicifolia*** **at Black Mountain Ranch and Annual Rainfall, 2000-2005**

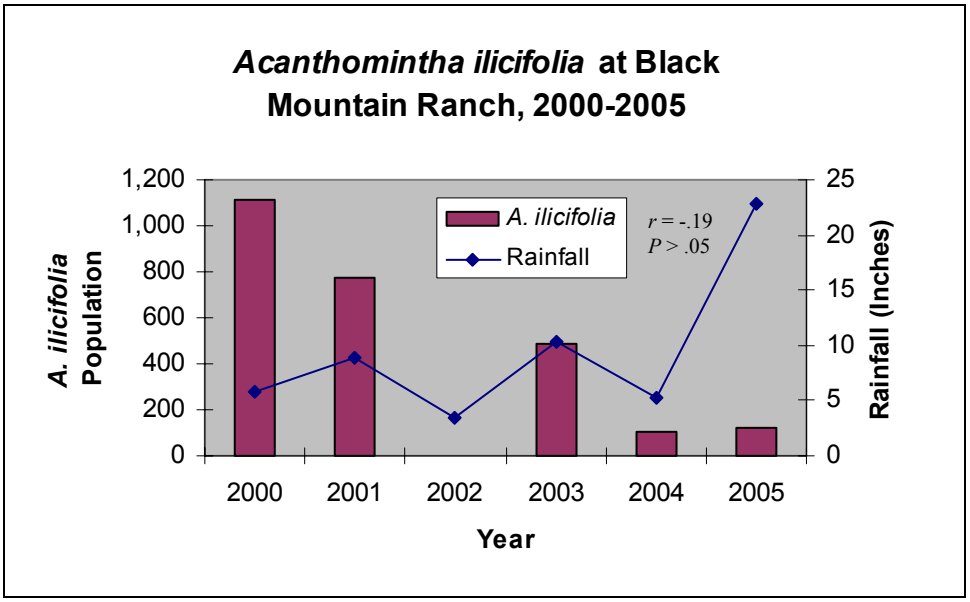


Figure 3. ***Acanthomintha ilicifolia*** **at Mission Trails and Annual Rainfall, 2000-2005**

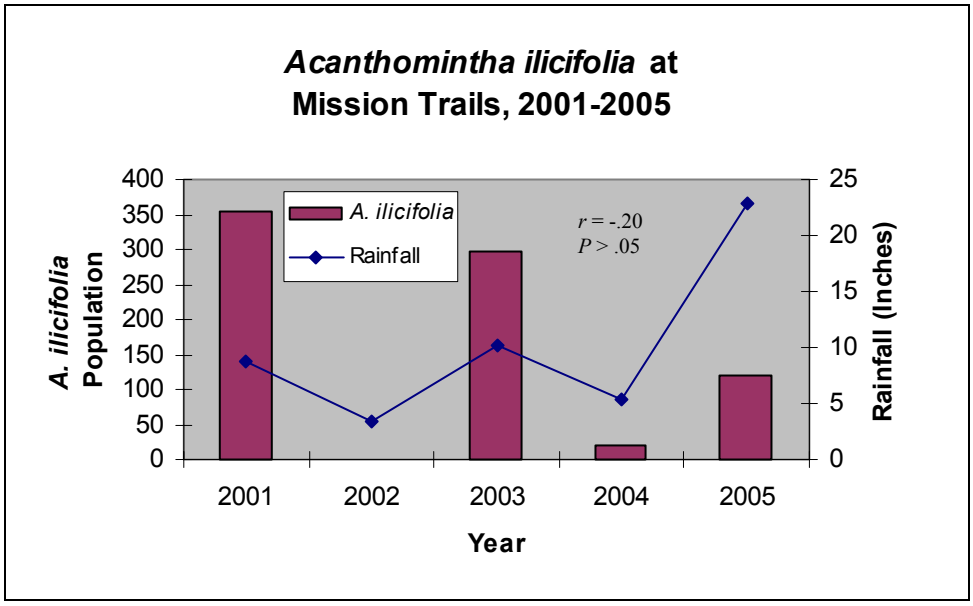
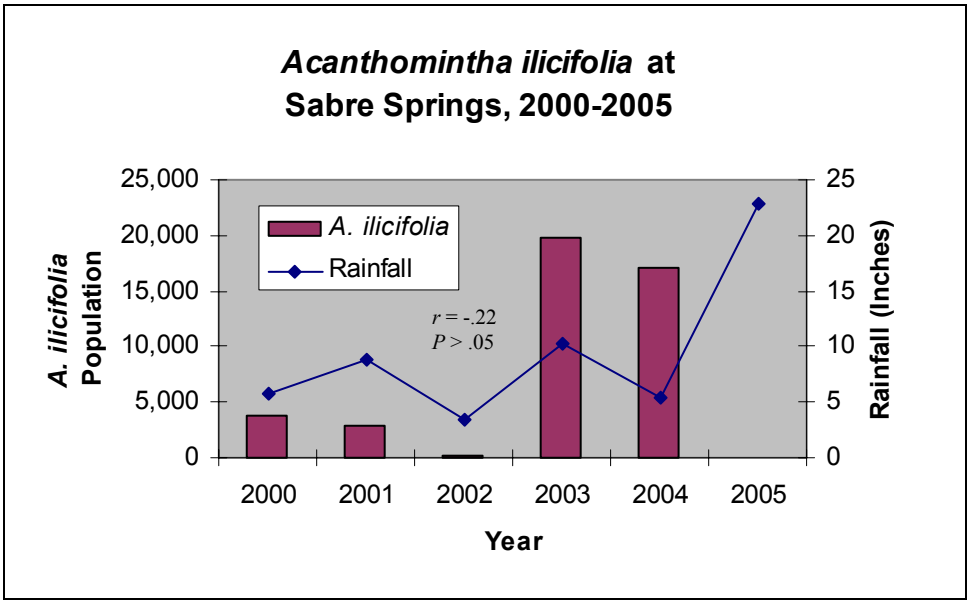


Figure 4. *Acanthomintha ilicifolia* at Sabre Springs and Annual Rainfall, 2000-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Recommendations

Black Mountain Ranch

Black Mountain Ranch Thornmint numbers were relatively low in 2005. The site should be inspected for non-native species and control of non-natives should occur, if necessary.

Mission Trails

Control of non-native plant species (e.g., non-native annual grasses, mustard [*Brassica* sp.], and Tocolote [*Centaurea melitensis*] should be pursued. Additionally, tests should be performed by removing or reducing Common Tarplant (*Deinandra fasciculata*) cover to determine if recent abundance of this native species is negatively impacting Thornmint in the area.

Penasquitos Canyon

The Penasquitos Canyon Thornmint population appears to be stable and is strongly correlated with annual rainfall. No immediate management actions are necessary at the site; however, the area should continue to be patrolled to insure that the site is not impacted by nearby trail users, and non-native species should be monitored at the site and controlled, if necessary.

Sabre Springs

The Sabre Springs Thornmint population appears to have been severely negatively impacted by some outside force, possibly non-native snail predation and/or non-native plant competition, in 2005. The site should be closely monitored and testing of different management actions (e.g., snail removal/eradication, non-native plant control) should be pursued.

Ambrosia pumila (San Diego Ambrosia)

Introduction

The MSCP Biological Monitoring Plan (1996) identifies Santee as an *Ambrosia pumila* monitoring location. Because the City of San Diego's Mission Trails *Ambrosia pumila* population is nearby the BMP-identified location, it has been monitored by the City since 1999.

Results/Analysis

The San Diego Ambrosia (*Ambrosia pumila*) populations at Mission Trails Regional Park were visited on July 14, 2005. At that time, over half of the main monitoring population (C6) had flowered and dried up (see site photos). Prior to 2005, the species flowered and was monitored in August. One potential explanation for the early senescence of above-ground plant mass is the fact that rains began relatively early during the 2004/2005 rain season.

The main Ambrosia population site was photographed, and the transplanted Ambrosia site was also visited and photographed during the 2005 site visit (Figures 2 and 3).

Based on discussions with Dr. Kathryn McEachern, staff had planned to flag and map the population, then (re) randomly allocate transects within the population area, rather than in the core population area only, as in previous years. However, due to the difficulty in locating stems among other dried vegetation, it was determined that a population boundary would not be reliable. Because the species is above ground most of the year, the species can be monitored prior to August for presence/absence surveys (i.e., non-demographic surveys) in future years. Staff has proposed performing *A. pumila* monitoring early in 2006, before the bulk of the other monitoring work, since surveys could not be performed in 2005.

Management Recommendations

Many of the *Ambrosia pumila* sites at Mission Trails are also support significant non-native grass populations (e.g., *Avena barbata, Bromus* sp.), which should be controlled.

Additionally, the spread of shrubby (native or non-native) species should be monitored. *A. pumila* historically grows on high floodplains; with the advent of damming throughout the area, these areas no longer flood and may type-convert over time as a result.

Mission Trails Regional Park, July 14, 2005

Ambrosia pumila at Mission Trails quantitative monitoring site (C6)

Panorama of *Ambrosia pumila* quantitative monitoring site (C6), near parking lot fence, facing north (July 14, 2005; photos merged using Canon PhotoStitch, v. 3.1)

Figure 1. Panorama of *Ambrosia pumila* transplant site, taken from adjacent trail facing west (July 14, 2005; photos merged using Canon PhotoStitch, v. 3.1).

Brodiaea orcuttii (Orcutt's Brodiaea)

Introduction

The MSCP Biological Monitoring Plan (1996) identifies Carmel Mountain and Del Mar Mesa as City of San Diego *Brodiaea orcuttii* monitoring locations. The General Dynamics, Carroll Canyon, and Nobel Drive populations have also been monitored since 2001 when they were identified via City-wide rare plant surveys.

Results

Site	Lead Monitor/s	Date	Method*	Result
General Dynamics	Greer/ Johnson	April 28, 2005	Permanent Plots, GPS	Shrub Adjacent Plot Density = 43.08 plants/m^2
				Open Area Plot Density = 39.42 plants/m^2
				Total Permanent Plot Density = 41.25 plants/m^2
				Total Population Area = 7,022 m^2
Nobel Drive	Johnson	April 29, 2005	Census	23 Plants
Carroll Canyon	Greer/ Johnson	April 28, 2005	Permanent Plots, GPS	Permanent Plot Density = 36.78 m^2
				Total Population Area = 18,006 m^2

*Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

In 2005, a revised monitoring protocol was utilized for the General Dynamics and Carroll Canyon *Brodiaea orcuttii* populations based on input from Dr. Kathryn McEachern. Six permanent plots (1 x 3 m) were selected by staff within both sites in order to track potential habitat change/succession. Three plots were placed immediately adjacent to shrub-dominated areas; three were placed in areas not immediately adjacent shrub habitats. All plots were selected in the field by staff (non-random). All plots were staked using surveyors nails and were also mapped using submeter GPS technology. Within each 1 x 3 m plot, all flowering and non-flowering individuals within each plot were counted (census) and recorded.

Relatively high average densities within the permanent plots were noted for General Dynamics and Carroll Canyon (41.25 plants/m^2 and 36.78 plants/m^2, respectively). The only other time densities were calculated was in 2003, when densities of 20.08 and 2.11 plants per meter squared were calculated at General Dynamics and Carroll Canyon, respectively.

Slightly lower densities were noted in open areas than in shrub adjacent areas at General Dynamics; however it is not anticipated that this difference is significant. Due to an oversight in data collection at Carroll Canyon, it could not be determined which plots were shrub adjacent and which were open. If the scientific advisors group determines that this method will be continued, new field forms will be prepared that are specific to this type of data collection.

At the General Dynamics site, several invasive species were noted, though density is relatively low at this time. Species noted include *Centaurea melitensis* (Tocolote), *Vulpia myuros* var. *myuros* (Fescue), *Nicotiana glauca* (Tree Tobacco) and *Polypogon monspeliensis* (Annual Rabbitsfoot Grass).

The Brodiaea population at Nobel Drive has declined slightly since monitoring began in 2001, when 43 plants were counted at the site. This may be due to the abundant cover of annual non-native grasses at the site (primarily *Lolium perenne*).

At the Carroll Canyon site, an area on the north side of the property was noted to have Eucalyptus cuttings dumped in it. In addition to *B. orcutti,* the area supported vernal pools and the federally endangered species *Eryngium aristulatum.* It appeared that the cuttings originated from the 12734 Calle de las Rosas residence, as the property had a recently-trimmed Eucalyptus and was immediately adjacent the dumping. MSCP and Park and Recreation staff reported this issue to Shirley Hall of City of San Diego Code Enforcement Department via email on May 16, 2005. A follow-up was sent to Ms. Hall on January 24, 2006 regarding the outcome of the issue; however, no response has been received to date.

Management Recommendations

General Dynamics

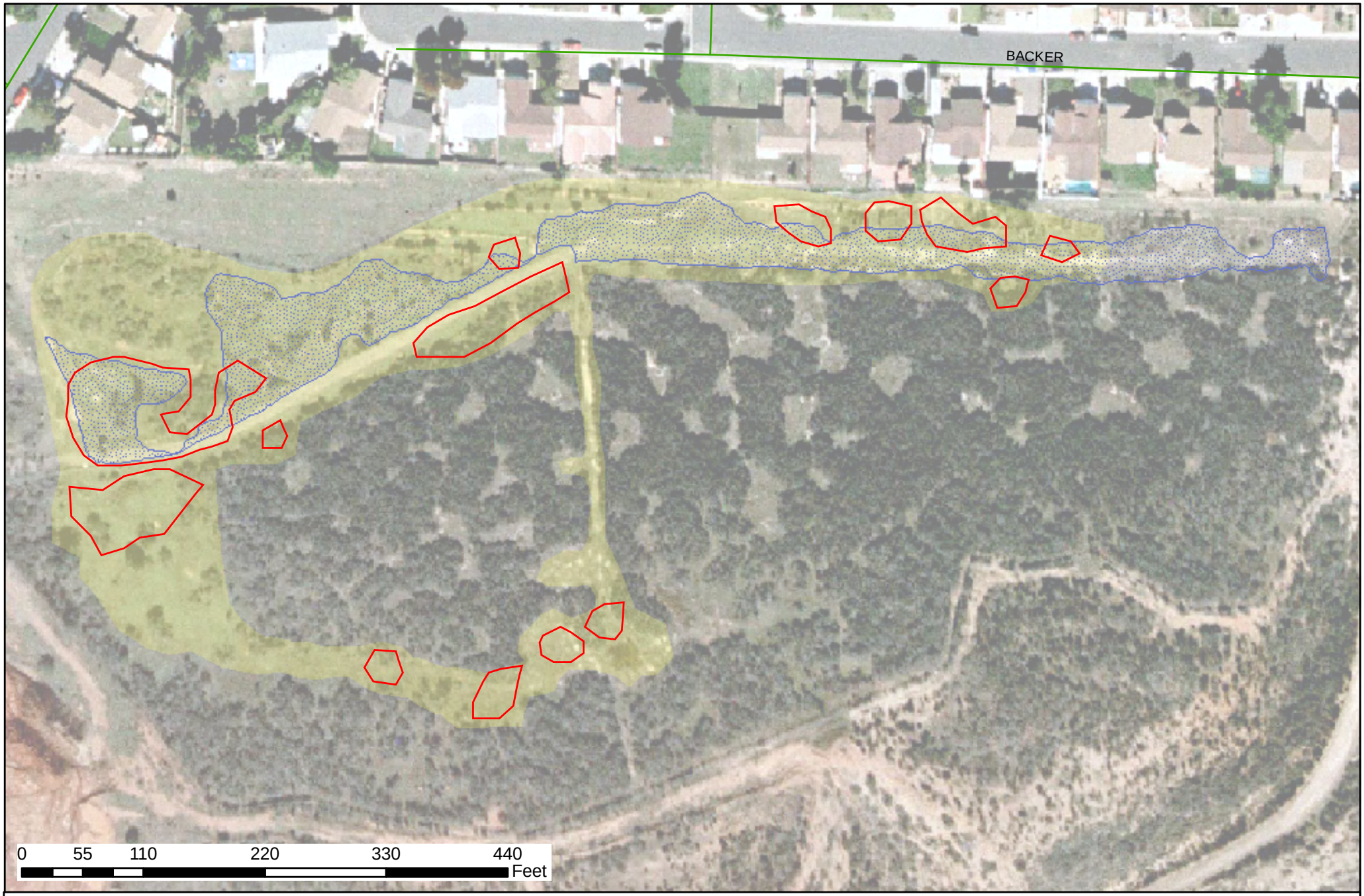
Invasive species such as *Centaurea melitensis* (Tocolote), *Vulpia myuros* var. *myuros* (Fescue), *Nicotiana glauca* (Tree Tobacco) and *Polypogon monspeliensis* (Annual Rabbitsfoot Grass) should be controlled at the site. Fencing surrounding the site should also be repaired; there are several breaks in the fence where it appears that trespassers may be entering the site.

Carroll Canyon

Removal of the illegally dumped *Eucalyptus* should be pursued if the case was not addressed through Code Enforcement. Additionally, several non-native grasses are present at the site (e.g., *Bromus* sp.) and should be controlled.

Nobel Drive

Invasive grasses pose a significant threat at this site and should be controlled. A proposal has been submitted through the Transnet EMP Funding program for vernal pool management throughout the City and would include dethatching around the Nobel Drive vernal pools, which would include the *Brodiaea orcuttii* population area.



2005 Population

2003 Population

Approximate Survey Area

Brodiaea orcuttii

Carroll Canyon Site

Survey Date: April 28th, 2005

Source: K. Greer, M. Johnson, J. Garcia, L. Hierl

2005 Population

2003 Population

Permanent Plot Points

(Point Represents NE Corner of 1X3 m Plot)

Brodiaea orcuttii

General Dynamics Site

Survey Dates: April 28th and 29th, 2005

Source: K. Greer, B. Miller, M. Johnson, J. Garcia, L. Hierl, K. Syverson

2005 Population

2003 Population

Brodiaea orcuttii

Nobel Drive Site

Survey Date: April 29th, 2005

Source: B. Miller, M. Johnson, K. Syverson C. Frogner

General Dynamics, April 28, 2005

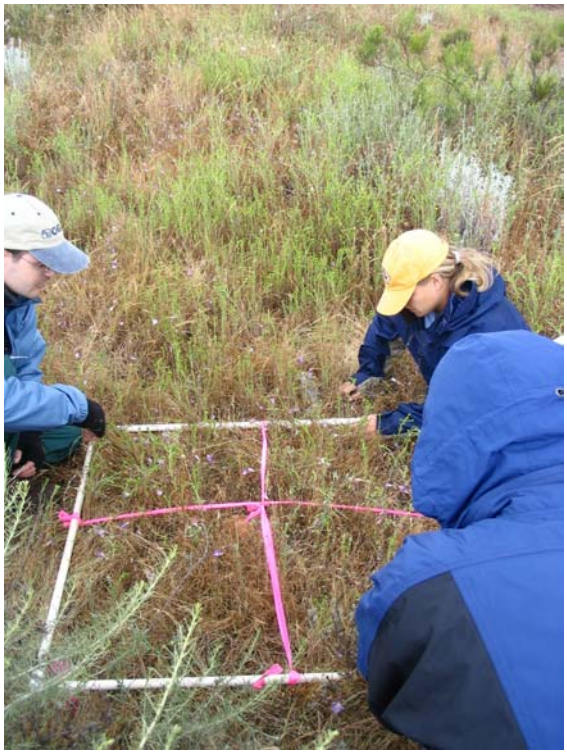

Plot 1 (open area), facing west


Plot 2 (shrub adjacent area), facing west

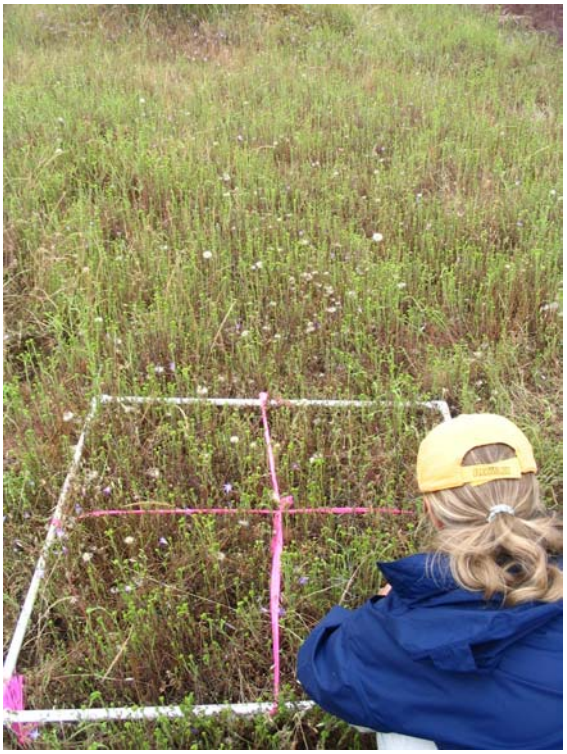

Plot 3 (open area)


Plot 4 (shrub adjacent area)

Plot 5 (shrub adjacent area)



Plot 6 (shrub adjacent area)



Plot 7 (open area)

Plot 8 (open area)

Carroll Canyon, April 28, 2005

Plot 1

Plot 2

Nobel Drive, April 29, 2005

Brodieaea orcuttii population area (flags mark individual plants)

Cordylanthus orcuttianus (Orcutt's Bird's Beak)

Introduction

The MSCP Biological Monitoring Plan (1996) does not identify any City of San Diego *Cordylanthus orcuttianus* monitoring locations. The Otay River Valley population has been monitored since 2001 due to the rarity of this species.

Results

Site	Lead Monitor/s	Date	Method*	Result
Otay River Valley	Johnson	June 30, 2005	Permanent Plots, GPS	Permanent Plot Density = 18.83 per m^2 Total Population Area = 684 m^2

*Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

The *C. orcuttianus* population appears to be relatively stable within the Otay River Valley monitoring area. Like many other monitored species, *C. orcuttianus* may be positively correlated with rainfall. Population counts have not been collected consistently during monitoring from 2001-2005 so a detailed analysis cannot be performed; however, numbers were generally higher in high rain years (2001 and 2003, estimated 1,000+ and 84,747 plants, respectively), and lower in low rain years (2002, when 166 plants were counted).

The monitoring methodology was revised for 2005 based on a site visit in spring 2005 during a site visit with Dr. Kathryn McEachern, who is the lead scientist for the MSCP rare plant monitoring revision. Because *C. orcuttianus* tends to occupy areas immediately adjacent trails or other disturbed areas within the Otay River Valley, Dr. McEachern recommended tracking the species in trail adjacent and non-trail adjacent areas. The revised methdology is detailed in the City's Monitoring Methods manual. The goal of the revised method is to monitor ttrail-adjacent vs. non-trail-adjacent population areas via permanent plot counts.

In addition, all general areas in the valley known to support *C. orcuttianus* were re-visited and mapped using a sub-meter GPS unit in 2005. Population boundaries were substantially the same as those mapped in 2003 (see figure, attached).

Management Recommendations

Primary threats to *Cordylanthus orcuttianus* in the Otay River Valley are mechanized trail widening or other ground disturbance, and invasive species. A number of invasive species occur in the river valley, including *Arundo donax, Tamarix ramosissima, Eucalyptus spp.* Though none of these species are currently in the immediate vicinity of the local *C. orcuttianus* population, they should be addressed throughout the River Valley in order to preclude impacts to this rare species. A proposal has been submitted through the Transnet EMP Funding program for *Arundo donax* and *Tamarix ramosissima* control in the area.

Invasive species noted in the immediate area of the *C. orcuttianus* included *Foeniculatum vulgare* (Common Fennel), *Nicotiana glauca* (Tree Tobacco), *Bromus hordeaceus* (Soft Chess), *Avena barbada* (Slender Wild Oat) and *Brassica nigra* (Black Mustard) . These species should be controlled via mechanical and/or chemical means.

No mechanical grooming of trails or soil disturbing activities should occur in this area.

2005 Population

2003 Population

Approximate Survey Area

Permanent Plot Points

Cordylanthus orcuttianus

Otay River Valley

Survey Date: June 30th, 2005

Source: M. Johnson, J. Garcia, L. Hierl, K. Syverson, C. Ford

2005 Population

2003 Population

Permanent Plot Points

Cordylanthus orcuttianus

Otay River Valley (west)

Survey Date: June 30th, 2005

Source: M. Johnson, J. Garcia, L. Hierl, K. Syverson, C. Ford

2005 Population

2003 Population

Permanent Plot Points

Cordylanthus orcuttianus

Otay River Valley (east)

Survey Date: June 30th, 2005

Source: M. Johnson, J. Garcia, L. Hierl, K. Syverson, C. Ford

Otay River Valley, June 30, 2005


Plot 1 (off trail), facing east


Plot 2 (trail adjacent), facing west


Plot 3 (off trail), facing north


Plot 4 (trail adjacent), facing west

Deinandra conjugens (Otay Tarplant)

Introduction

The MSCP Biological Monitoring Plan (1996) identifies Proctor Valley as an MSCP *Deinandra conjugens* monitoring location. The majority of the *D. conjugens* population in this area occurs on U.S. Fish and Wildlife Refuge land; however, a small portion occurs on City of San Diego Water Department land. The City has monitored this population since 2003.

Results

Site	Lead Monitor/s	Date	Method*	Result
Proctor Valley	Johnson	June 9, 2005	Belt Transect, GPS	Population Area = 3,347 m2 Density = 1.65 plants/m^2

*Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

In 2005, transect counts were performed similar to 2003 methodology on the transects established in 2003. However, a large area of *D. conjugens* occupied habitat was discovered and mapped on the hill adjacent to the previously-identified population (in 2003). It is unclear whether this area is newly established or was not surveyed in 2003; however, based on the similar density and structure to the eastern ridge, it is likely the species occupied the area in previous years.

Because of the larger population area and the fact that transects were established based only on the eastern portion of the population (1,903 m^2), population estimates can only be considered reliable for the eastern portion of the population. The estimated population of the eastern area (same area monitored in 2003 and 2004) is 3,130 plants/m^2. In 2003 this area had an estimated population of 45,737 (density 24.04 plants/m^2) and in 2004, the censused population was 25 (density 0.01 plants/m^2).

If it is assumed that the transects selected in 2003 are representative of the entire population, including the newly discovered western slope population, the estimated total site population would be 5,506 *D. conjugens* plants. It should be noted, however, that this is an unreliable assumption; transects must be allocated throughout the entire plant population in future years to make reliable projections of population.

Several non-native species were noted in the area, primarily non-native grasses such as *Bromus* sp., *Avena* sp., and *Lolium perenne*. *Centaurea melitensis* is also dispersed throughout the site, and *Salsola tragus* occurs along the dirt trail that bisects the population. There are numerous illegal off-road trails thoughout this area that have impacted habitat.

Analysis

The estimated population of the eastern area (which is comparable to previous years) was higher than in 2004, but lower than 2003, which was a lower rainfall year (Table 1).

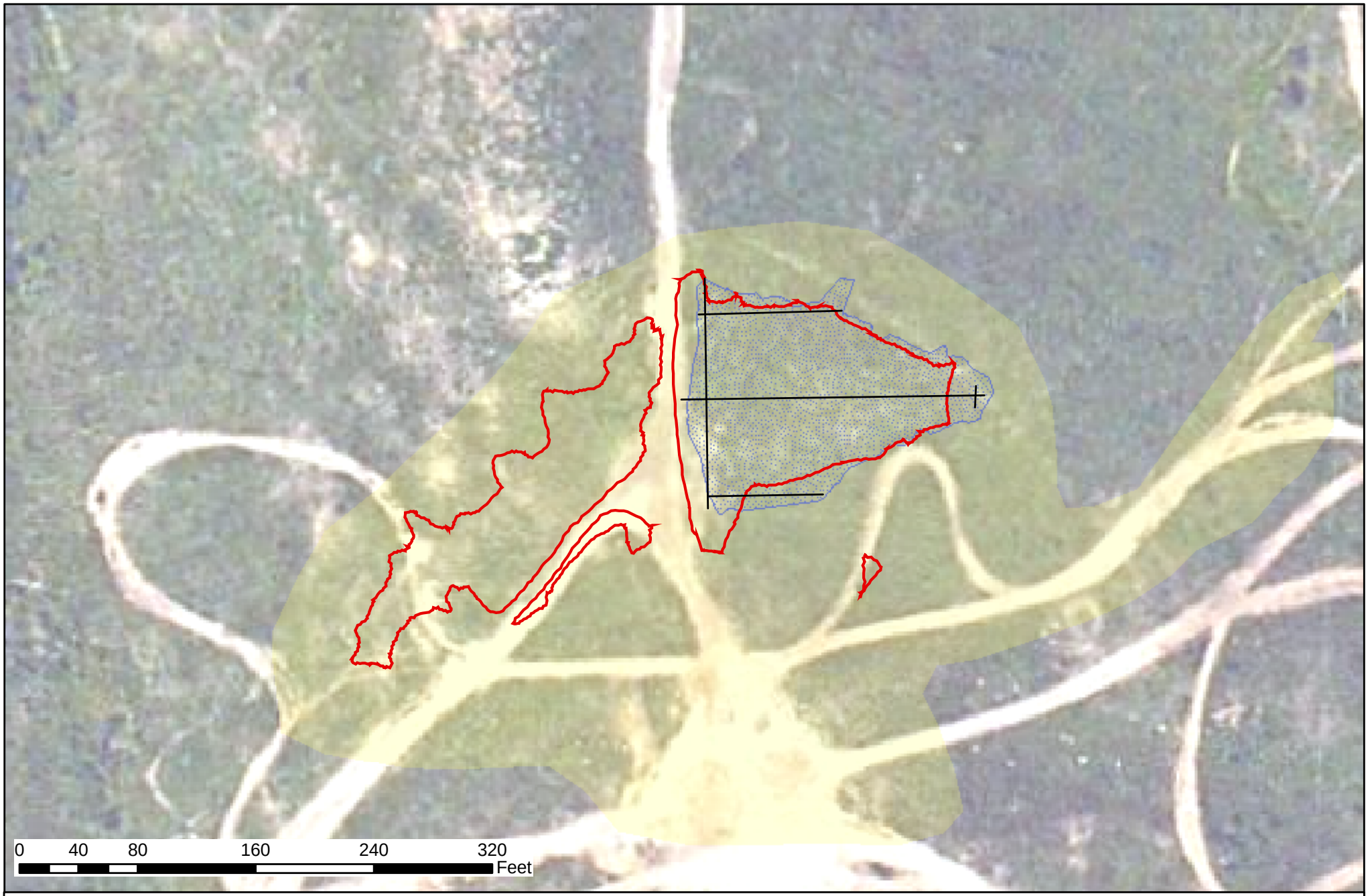
Table 1. Proctor Valley eastern slope *D. conjugens* plant counts and rainfall (by water year, Oct-Sept)

Year	Rainfall (inches)	Estimated Population (Eastern Slope)
2003	10.24	45,737
2004	5.31	25
2005	22.81	3,130

Thus, it appears that *Deinandra conjugens* populations are somewhat positively correlated with rainfall. However, 2005 counts would be expected to be as high or higher than 2003 based on rainfall alone. The low numbers may be a result of relatively high non-native grass populations in the area; however, this was generally the same in 2003. Monitoring staff performing plant counts has been different from year to year, which can contribute to error. Low population during the previous year (thus low seed stock, depending on viability length) was considered; however, 2002 was an extremely dry year, with only 3.44" of rain. Regional trend analysis may elucidate this issue.

Management Recommendations

Non-native species such as *Bromus* sp., *Avena* sp., *Lolium perenne*, *Centaurea melitensis* and *Salsola tragus* should be controlled in the area. Off-road activity should be controlled through this entire region.



2005 Population

2003 Population

Approximate Survey Area

Permanent Transects

Deinandra conjugens

Proctor Valley

Survey Date: June 9th, 2005

Source: M. Johnson, L. Hierl, K. Syverson, J. Atha

Proctor Valley, June 9, 2005

Transect 3 (north transect), facing east

Transect 2 (middle transect), facing east

Transect 1 (southern transect), facing east

Monitoring site panorama from top of slope/trail, facing northwest, north, northeast (photos merged using Canon PhotoStitch, v.3.1).

Panorama of eastern monitoring area, facing northeast, east and southeast (photos merged using Canon PhotoStitch, v.3.1).

Dudleya brevifolia (Short-Leaf Dudleya)

Introduction

The MSCP Biological Monitoring Plan (1996) identifies Del Mar Heights/Crest Canyon and Carmel Mountain as City of San Diego Short-Leaf Dudleya (*Dudleya brevifolia*) monitoring locations.

Results

Site	Lead Monitor/s	Date	Method*	Result
Carmel Mountain	Greer/Johnson	May 19, 2005	Quadrat	123,200 Plants Density = 99.81 plants/m^2
Crest Canyon	Johnson	May 19, 2005	Census, GPS	Population Area (N SubPop) = 1,704 m2 Population (S SubPop) = 31 plants
Skeleton Canyon	Johnson	May 19, 2005	Presence/Absence	Present, Size Similar to Previous Years

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

The estimated population at Carmel Mountain in 2005 was 123,200 above-ground plants, up from 18,907 and 111,313 in 2004 and 2003, respectively. Population boundaries were checked against 2003 mapping, and boundaries were significantly the same (for population locations, please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual).

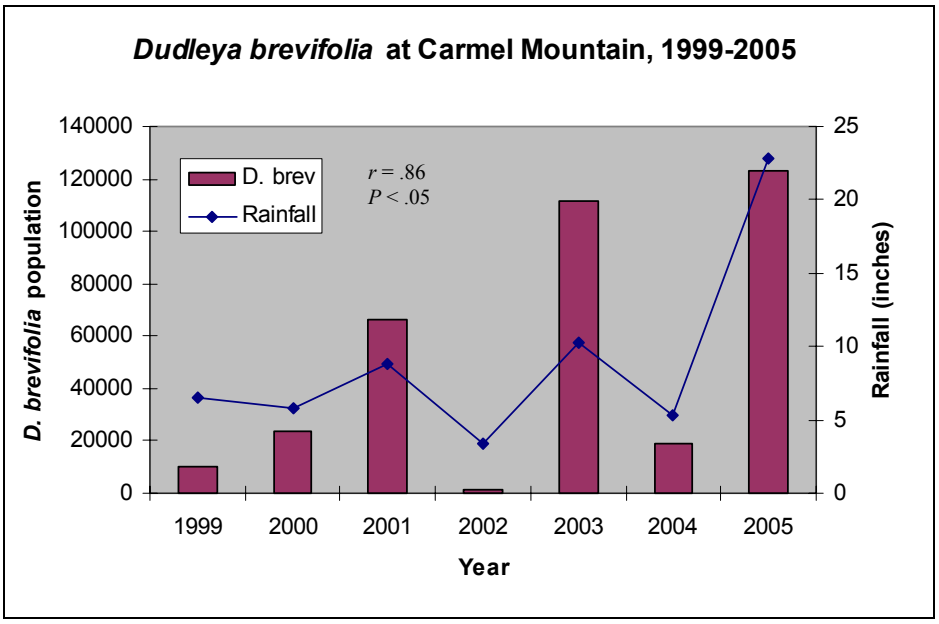
At the Crest Canyon site, a census of the southern subpopulation was taken. Population boundaries of the northern subpopulation were mapped; however, no census or quantitative monitoring was performed based on concerns regarding previous methods and trampling impacts, as well as input from Dr. Kathryn McEachern.

The UCSD Skeleton Canyon site was visited and a presence/absence survey was performed. The population is intact with no immediate threats, and appears similar in size and density as previous years.

Analysis

Carmel Mountain *D. brevifolia* plant counts from 1999-2005 were examined and charted with wet season rainfall using Microsoft Excel. The population exhibits a positive correlation with rainfall ($r = 0.8559$; $P < 0.05$; Figure 5).

Figure 5. *Dudleya brevifolia* at Carmel Mountain and Annual Rainfall, 1999-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Recommendations

Carmel Mountain

Carmel Mountain *D. brevifolia* populations have been relatively stable since monitoring began, and efforts have been made in recent years to control pedestrian and equestrian access to these areas. However, continued use of these areas is evident and additional control efforts should be pursued. Stronger fencing should be considered, especially for subpopulations two and three, both of which are bisected by a trail.

Crest Canyon

The Crest Canyon sites continue to be impacted by unauthorized trails and are threatened by invasive plants such as highway iceplant (*Carpobrotus edulis)*. MSCP met with Park and Recreation staff in Fall 2005 to begin access control planning and preliminary invasives control planning. Senior Ranger Lori Charett organized a youth volunteer day and some of the initial access control work was done. A proposal has been submitted through the Transnet EMP Funding program for full trail work and to control invasives.

Skeleton Canyon

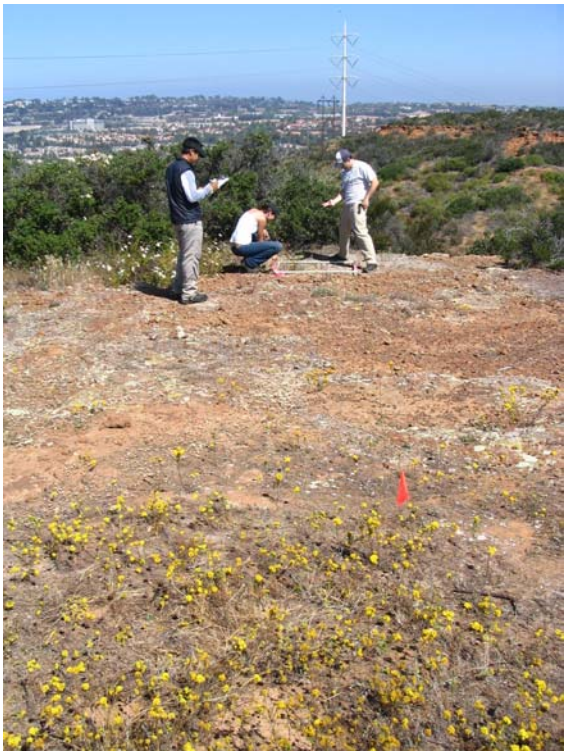
Skeleton Canyon is owned and managed by the University of California, San Diego. The Dudleya population at this site appears to be relatively stable and free from immediate threats. However, the canyon has several invasives threats (e.g., *Acacia* sp, *Nicotiana glauca, Cortaderia* sp., *Limonium sinuatum, Brassica nigra, Centaurea melitensis*) which could ultimately impact

the local Dudleya population. Pedestrian access issues may also be a problem in the future as there are multiple trails through the area, one of which is immediately adjacent to the Dudleya.

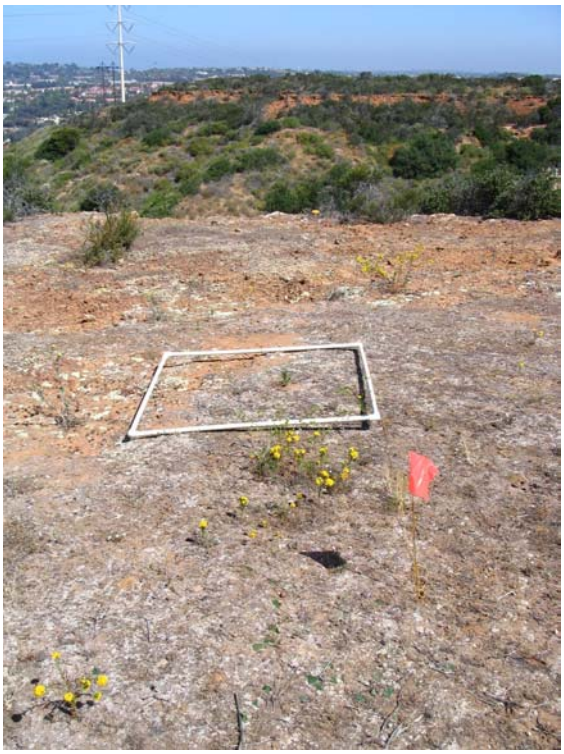
Carmel Mountain Subpopulation One, May 19, 2005

Transect 1, facing northwest

Transect 2, facing northwest



Transect 3, facing northwest



Transect 4, facing northwest

Transect 5, facing northwest

Transect 6, facing northwest

Transect 7, facing northwest

Carmel Mountain Subpopulation Two, May 19, 2005

Transect 1, facing east

Transect 2, facing east

Carmel Mountain Subpopulation Three, May 19, 2005

Overall view of portion of subpopulation three (showing northeast side of trail), facing northwest

Transect 1, facing southwest

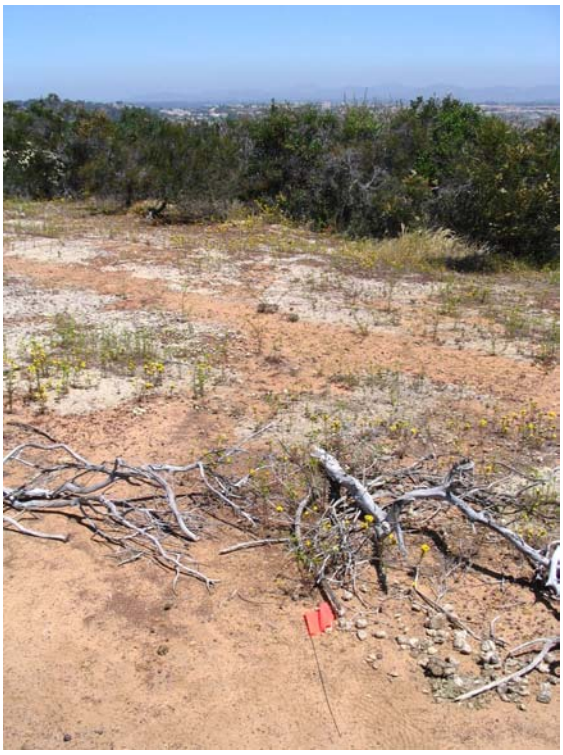
Transect 2, facing southwest

Transect 3, facing southwest

Transect 4, facing southwest

Transect 5, facing northeast

Transect 6, facing northeast



Transect 7, facing northeast

Transect 8, facing northeast

Transect 9, facing northeast

Transect 10, facing northeast

Transect 11, facing northeast

Dudleya brevifolia, closeup

Dudleya brevifolia, closeup

Crest Canyon, Northern Mesa Subpopulation

Panorama of northern mesa and adjacent residential uses, April 18, 2005 (photos merged using Canon PhotoStitch, v. 3.1).

Northern mesa, facing east

Northern mesa, facing southeast

Crest Canyon, Southern Subpopulation (Along Eastern Boundary of Park)

Crest Canyon southern *Dudleya brevifolia* subpopulation, facing south (note: photos merged using Canon PhotoStich v. 3.1)

Dudleya variegata (Variegated Dudleya)

Introduction

The MSCP Biological Monitoring Plan (1996) specifies Marron Valley and East Elliot/Fanita as *Dudleya variegata* monitoring locations within the City of San Diego or owned by the City of San Diego. Much of East Elliot has not yet been preserved; the *D. variegata* in this area will be monitored once acquisition is complete or nearly complete. The Otay Lakes, Mission Trails, and Spring Canyon (among others) populations have also been monitored since 2001 when they were identified via City-wide rare plant surveys.

Results

Site	Lead Monitor/s	Date	Method*	Result
Marron Valley	Johnson	April 12, 2005	Census, GPS	7,973 Plants; 803 m²
Mission Trails	Mike Kelly, Fred Kramer	June 1, 2005 June 4, 2005	Census	2,878 Plants
Otay Lakes	Johnson	May 12, 2005 June 2, 2005	Belt Transect	0.23 Plants /m²; Est Pop = 45,377
Spring Canyon	Johnson	June 10, 2005	Census, GPS	2,996 Plants; 150 m²

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

Analysis

Plant populations from Otay Lakes and Mission Trails Regional Park were examined and correlated with water year rainfall using Microsoft Excel. Both show a general trend toward a positive correlation; however, the correlation was not statistically significant ($r = 0.9627$; $P > 0.05$ for Otay Lakes and $r = 0.81116$; $P > 0.05$ for Mission Trails; Figures 6 and 7). Because there were only three and five observations, respectively, though, degrees of freedom were very low. Analyses with more data points (years) may in fact show a statistically significant positive correlation.

Figure 6. *Dudleya variegata* at Otay Lakes and Annual Rainfall, 2003-2005

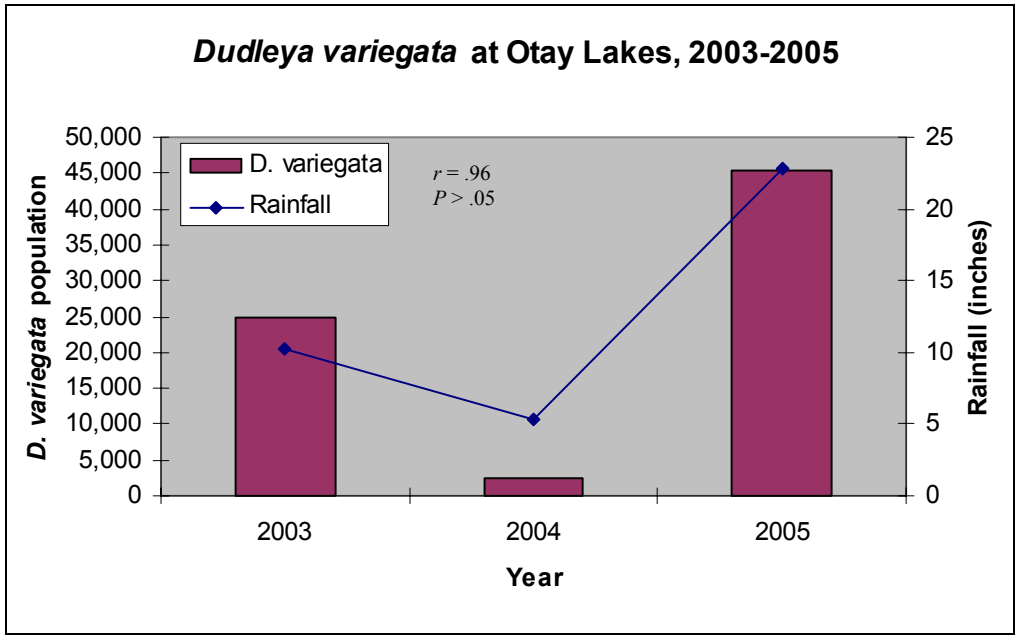
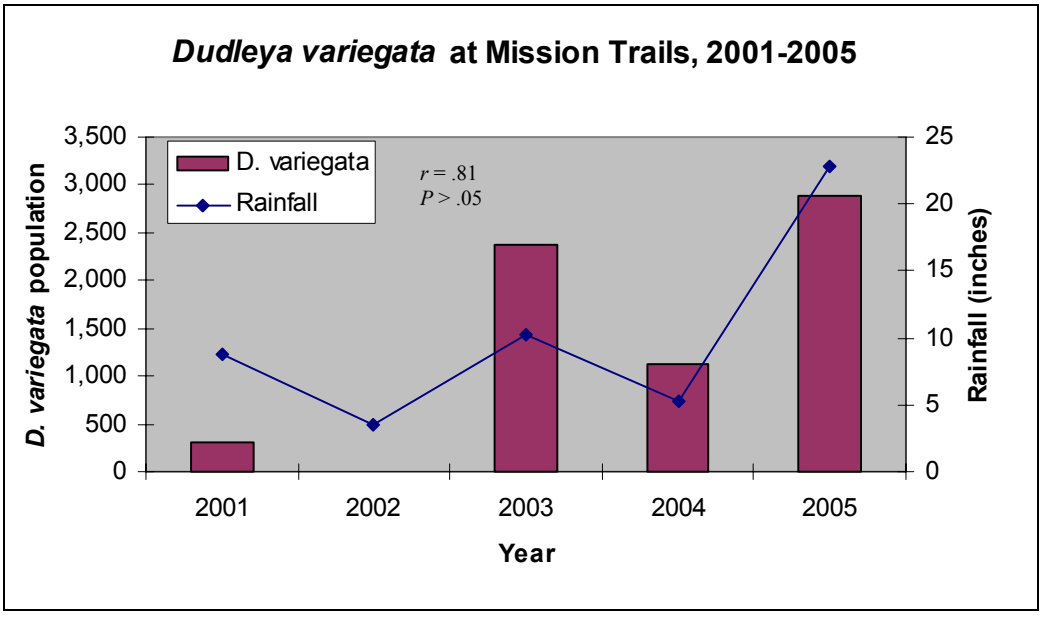


Figure 7. *Dudleya variegata* at Mission Trails and Annual Rainfall, 2001-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Recommendations

Marron Valley

The Marron Valley site has several non-native species within the population, primarily non-native grasses such as *Bromus* sp. and *Avena barbata*. These should be controlled in the area.

Mission Trails Park

The Mission Trails *D. variegata* population also has several non-native species within the population, including *Centaurea melitensis* and *Avena barbata*. These should be controlled in the area.

Otay Lakes

The Otay Lakes site has some non-native species within the population, primarily non-native grasses such as *Bromus madritensis* ssp *rubens*, *Bromus hordeaceus*, *Avena barbata*. Other non-natives in the area include *Centaurea melitensis* and *Sonchus oleraceus*. All of these should be controlled in the area.

Spring Canyon

The Spring Canyon site also supports some non-native species, primarily *Avena barbata*. The larger issue on this entire mesa is illegal goat grazing by the adjacent landowner. This issue was forwarded to the City Attorney's office in 2004; however, no resolution has occurred to our knowledge.

2005 Population

2003 Population

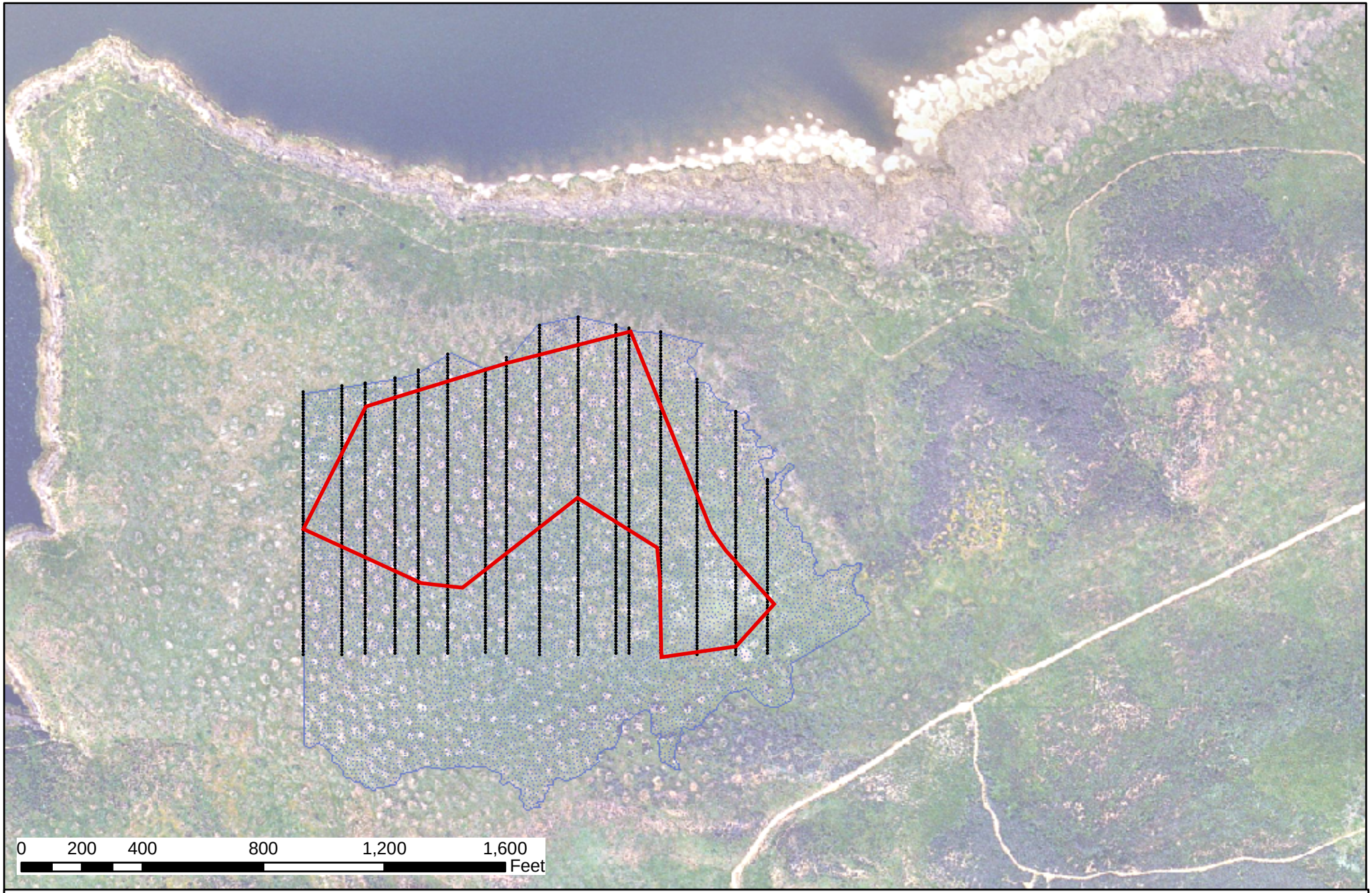
Approximate Survey Area

Dudleya variegata

Marron Valley

Survey Date: April 12th, 2005

Source: M. Johnson, B. Miller, J. Atha, C. Cibit



Approximate 2005 Population*

2003 Population

Permanent Transects

* Based on transect locations only; population not remapped in 2005.

Dudleya variegata

Otay Lakes Site

Survey Dates: May 12th and June 2nd, 2005

Source: B. Miller, M. Johnson, J. Garcia, C. Kinkade, L. Hierl, K. Syverson, R. Rodriguez, C. Cibit

Otay Lakes, May 12, 2005

Transect 2, facing north

Dudleya variegata

Spring Canyon, June 10, 2005

Mesa top *D. variegata* monitoring sight

Dudleya variegata, interspersed with taller *Deinandra fasciculata*

Lessingia filaginifolia var. *linifolia* (Del Mar Sand Aster)

Introduction

The MSCP Biological Monitoring Plan (1996) specifies the San Dieguito River Bluffs (i.e., 'Overlook Park' and 'Torrey Highlands') and Del Mar Mesa as *Lessingia filaginifolia* var. *linifolia* monitoring locations within the City of San Diego. However, no *L. filaginifolia* var. *linifolia* were located on Del Mar Mesa during 2001 City-wide reconnaissance surveys. Significant populations were found in the northeastern area of Carmel Mountain Park, though, and those sites ('Carmel Valley' and 'Carmel Mountain') have been monitored along with the San Dieguito River Bluffs sites since 2001.

Results

Site	Lead Monitor/s	Date	Method*	Result
Carmel Mountain (E)	Johnson	July 21, 2005	Census	353 Plants
Carmel Valley (aka Crml Mtn W)	Johnson	July 21, 2005	Census	730 Plants
Overlook Park	Johnson	July 29, 2005	Census	1,173 Plants
Torrey Highlands	Johnson	July 21, 2005	Census	1,184 Plants

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods.

All sites were surveyed by census, as had been done in previous years. At the Torrey Highlands and Overlook Park sites, areas that had not previously been mapped were found to support the species. It was not clear whether these subpopulations were present in previous years and the areas were not surveyed, or they are newly established areas. As such, 'survey areas' have been delineated on report maps to distinguish what areas were surveyed. Several areas of *L. filaginifolia* var. *linifolia* were noted at Carmel Valley, Overlook Park, and Torrey Highlands in 2005 that had not previously been reported, and new boundaries were mapped using submeter GPS technology (see attached aerial photographs). Population boundaries at Carmel Mountain East were substantially the same as in 2003 mapping (for population locations, please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual).

At nearly all the sites, *Carpobrotus edulis* (Highway Iceplant) was noted to be encroaching into *L. filaginifolia* var. *linifolia* habitat, even in interior areas. At the Carmel Mountain West site, it is present thoughout the area, and other invasives such as *Cortaderia* sp. (Pampas Grass), *Acacia* sp. (Acacia), and *Cistus ladanifer* (Gum Cistus) were observed in interior habitat areas of the site. Additionally, motorbike tracks were observed near the top of the mountain.

At the Overlook Park site, located along the San Dieguito River bluffs immediately north of the developed park, *Carpobrotus edulis* was noted in interior areas hanging in long strands from bluffs, then establishing at the bottom of the bluff. At this site, *Acacia* sp. (Acacia) has been planted just outside the adjacent property boundaries and is encroaching into native habitat. According to local residents, the *Acacia* was planted by the City in order to provide a fire fuelbreak. *Cortaderia jubata* (Pampas Grass) was also noted in areas near the residences, and

Ehrharta erecta (Panic Veldgrass), a newly reported and highly invasive non-native, was noted at the top of the slope just outside of the developed park area. It appears that this area and the areas planted with *Acacia* sp. are being artificially irrigated via sprinkler heads that have been installed in the area (approximately 10-15 feet outside of park fence, in an area formerly occupied by *L. filaginfolia* var. *linifolia*). Additionally, *Delosperma* sp. (likely *D. cooperi*; Hardy Ice Plant) was noted to be encroaching into native habitat from the adjacent developed Overlook Park.

At Torrey Highlands, further east along the San Dieguito River bluffs, *Carpobrotus edulis* is present in an area that supported *L. filaginifolia* var. *linifolia* in previous years. It is planted at the top of the ridge in the community park. *Mesembyanthemum crystallinum* (Crystal Iceplant) is also present at this site, though at lower densities than *C. edulis.*

Analysis

Plant populations at three of the monitoring sites from 2003-2005 were examined and correlated with water year rainfall using Microsoft Excel. All three populations appear to be affected by rainfall levels, however, the correlation was not statistically significant (Figures 7-9). Correlation analyses were not performed at Torrey Highlands due to uncertainty regarding previous search areas (for full discussion of this issue, please see the MSCP Rare Plant Monitoring: Field Monitoring Methods Manual, 2005).

Because there were only three observation years that could be included in the analysis, the test had only one degree of freedom, thus the r value, or correlation, would have had to have been near 100 percent to prove statistically significant (with more observations, the correlation can be slightly lower, e.g. a 95 percent correlation with three degrees of freedom, or five observations, would be significant). Thus, analyses with more data points (years) would likely show a statistically significant positive correlation.

Figure 8. *Lessingia filaginifolia* var. *linifolia* at Carmel Mountain East and Annual Rainfall, 2003-2005

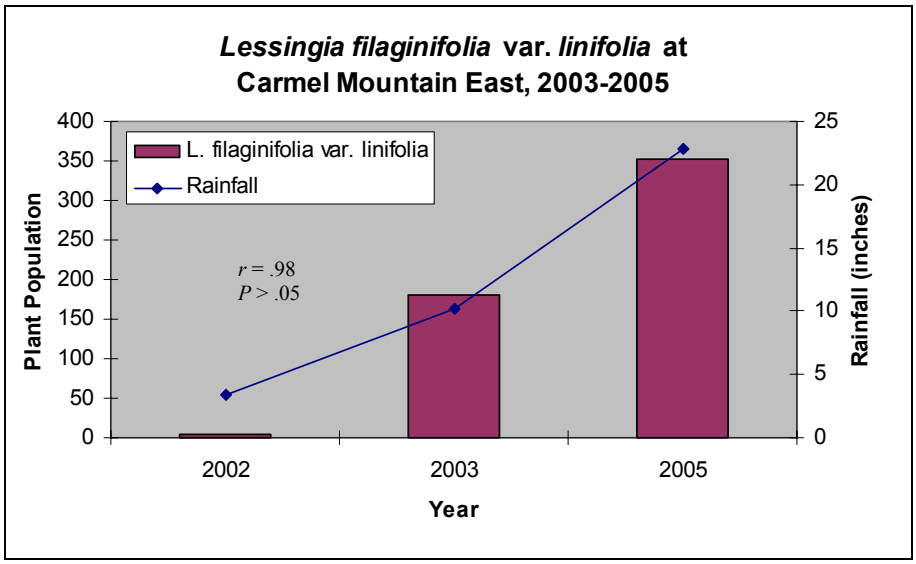


Figure 9. *Lessingia filaginifolia* var. *linifolia* at Carmel Valley and Annual Rainfall, 2003-2005

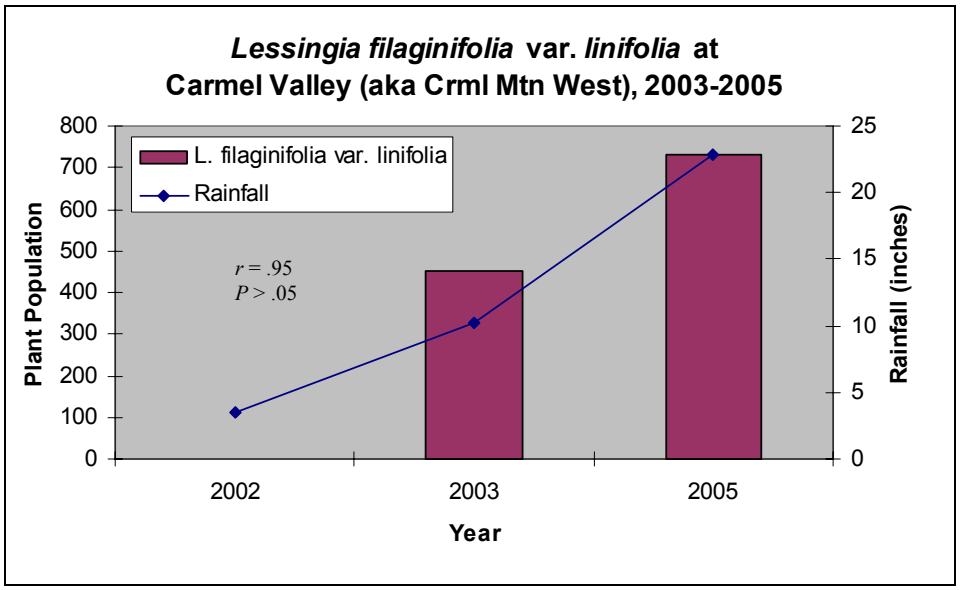
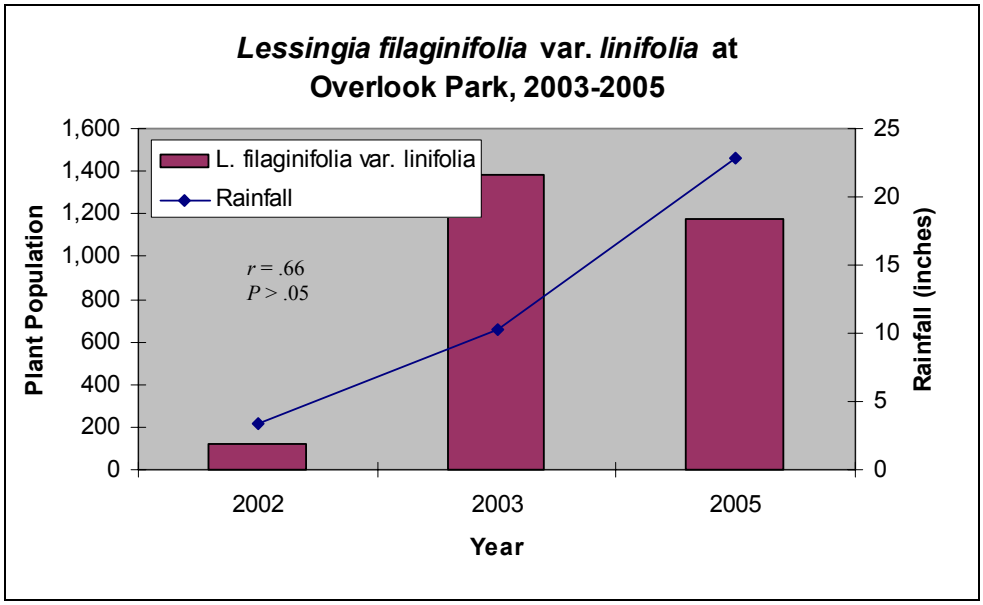


Figure 10. *Lessingia filaginifolia* var. *linifolia* at Overlook Park and Annual Rainfall, 2003-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Recommendations

Carmel Mountain East

Invasives such as *Carpobrotus edulis* (Highway Iceplant) should be controlled, and pedestrian and equestrian access in unpermitted areas should also be controlled.

Carmel Valley (aka Carmel Mountain West)

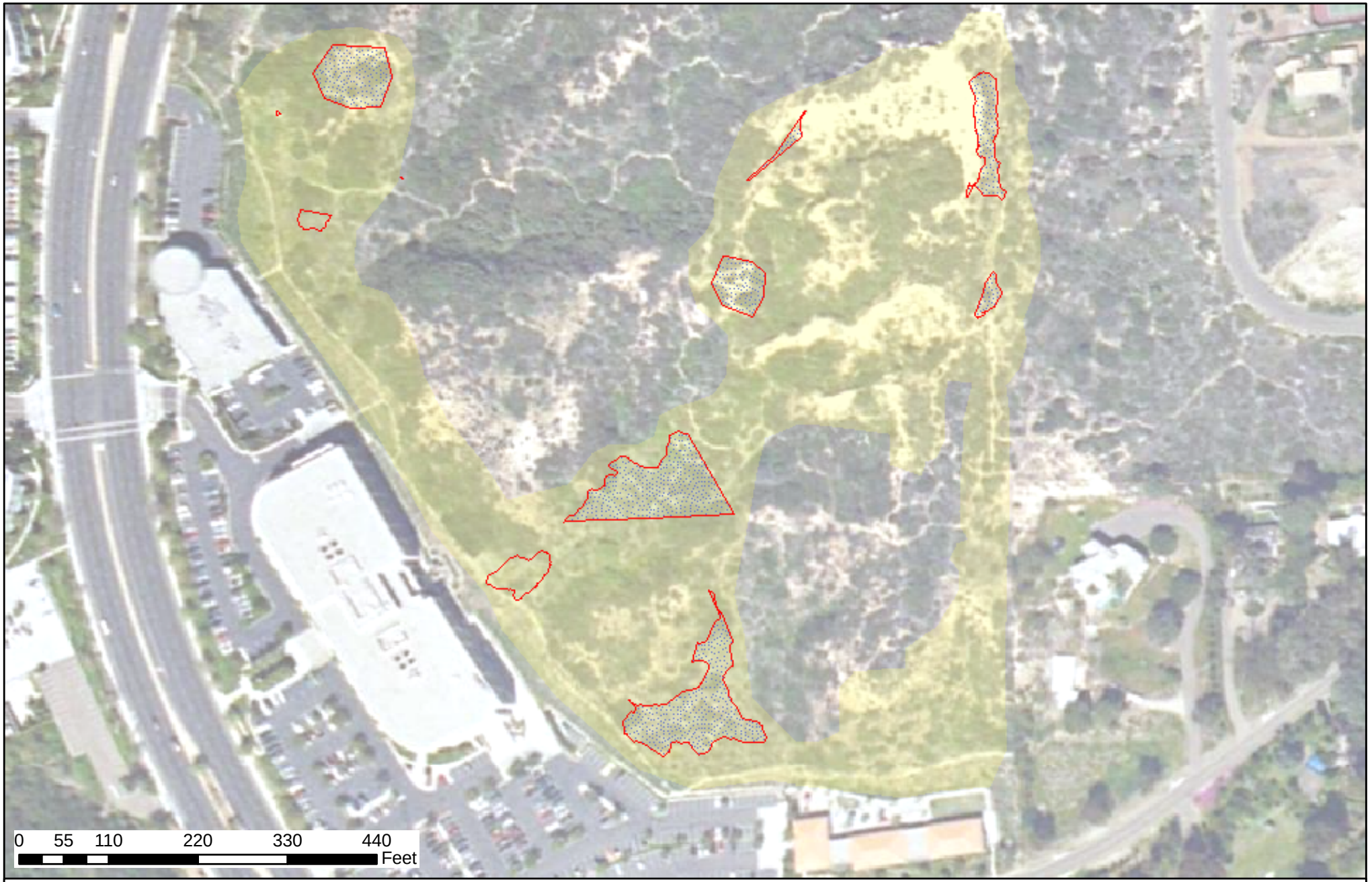
Invasives such as *Carpobrotus edulis* (Highway Iceplant), *Cortaderia* sp. (Pampas Grass), *Acacia* sp. (Acacia), and *Cistus ladanifer* (Gum Cistus) should be controlled, and unpermitted motorbike use in the area should also be controlled.

Overlook Park

Invasives such as *Carpobrotus edulis* (Highway Iceplant), *Acacia* sp. (Acacia), *Cortaderia jubata* (Pampas Grass), *Ehrharta erecta* (Panic Veldgrass), and *Delosperma* sp. (likely *D. cooperi*; Hardy Ice Plant) should be controlled. Artificial irrigation devices should be removed in preserve areas, and replanting areas of the adjacent community park with non-invasive species should be pursued.

Torrey Highlands

Control invasives such as *Carpobrotus edulis* (Highway Iceplant) and *Mesembyanthemum crystallinum* (Crystal Iceplant), and pursue replanting areas of the adjacent community park with non-invasive species.



2005 Population

2003 Population

Approximate Survey Area

Lessingia filaginifolia var. *linifolia*

Carmel Mountain West

Survey Date: July 21st, 2005

Source: M. Johnson, K. Syverson, J. Garcia, C. Ford

2005 Population

2005 Population - Not Censused

2003 Population

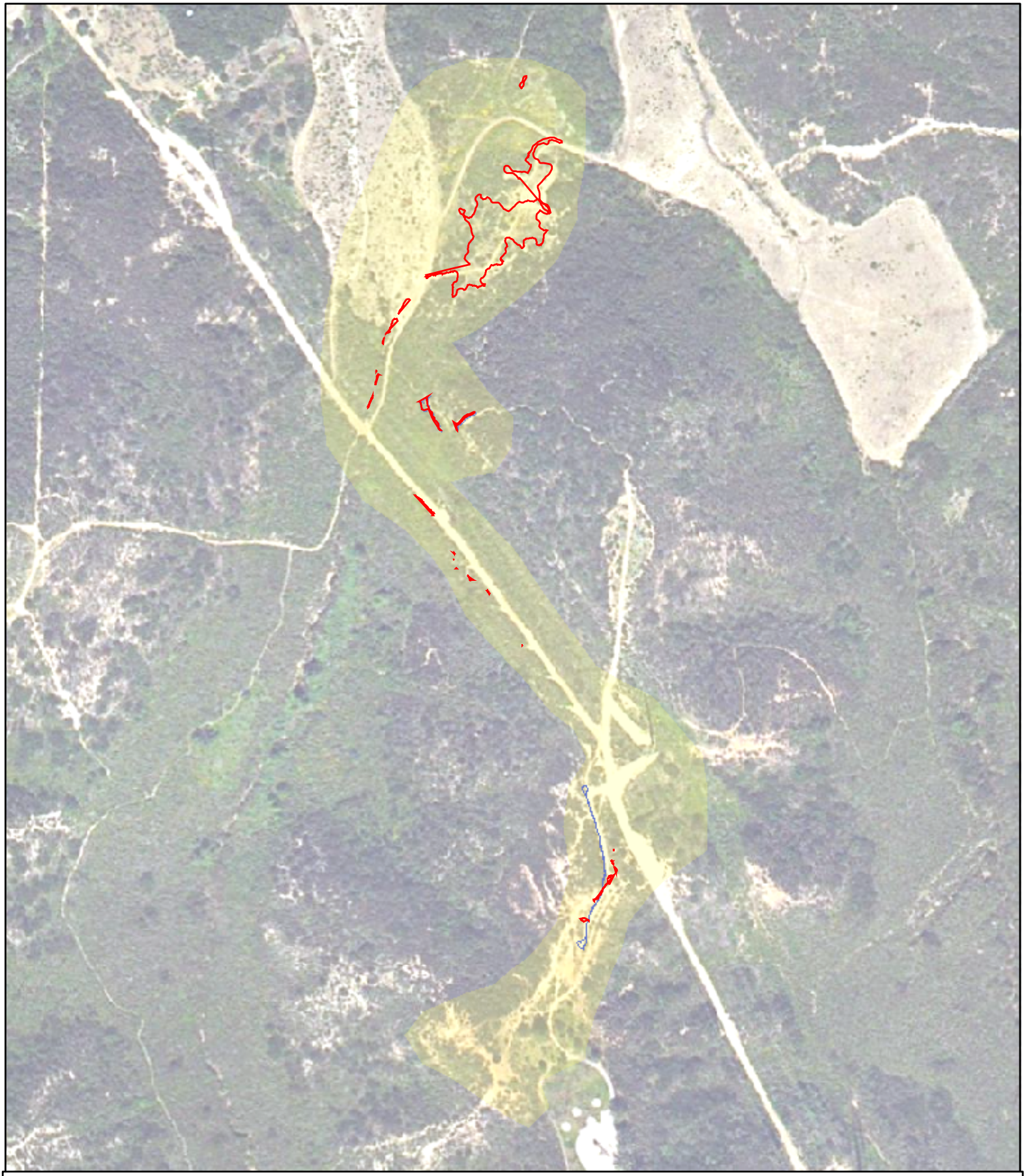
Approximate Survey Area

Lessingia filaginifolia var. *linifolia*

Overlook Park

Survey Date: July 29, 2005

Source: M. Johnson, J. Garcia, K. Syverson, R. Rodriguez



Lessingia filaginifolia var. *linifolia*

Torrey Highlands

2005 Population

2003 Population

Approximate Survey Area

Survey Date: July 21st, 2005

Source: M. Johnson, J. Garcia, K. Syverson, C. Ford

Overlook Park, July 29, 2005

Panorama from southeast corner of Overlook Park monitoring site, facing northwest, north and northeast (photos merged using Canon PhotoStitch, v. 3.1).

Panorama from center of park fence facing facing northwest, north and northeast (photos merged using Canon PhotoStitch, v. 3.1).

Carpobrotus edulis escaping into preserve from residences located immediately west of community park, facing west

Delosperma sp. encroaching into *L. filaginifolia* var. *linifolia* habitat

Acacia sp. plantings with remnant *L. filaginifolia* var. *linifolia*

Torrey Highlands, July 21, 2005

L. filaginifolia var. *linifolia* habitat encroached upon by *C. edulis* (photos merged using Canon PhotoStitch, v. 3.1)

View of population along southwest/northeast trending trail, at northern end of Torrey Highlands population

L. filaginifolia var. *linifolia*

Lotus nuttallianus (Nuttall's Lotus)

Introduction

The MSCP Biological Monitoring Plan (1996) does not specify any Nuttall's Lotus (*Lotus nuttallianus)* monitoring locations within the City of San Diego. However, a large *L. nuttallianus* population was discovered in Mission Bay in 1998 by Gary Suttle, so the Mission Bay site is regularly monitored by the City as this is among the few known occurrences of this species.

In addition to normal monitoring activities, follow-up monitoring was performed in order to determine the effectiveness of invasives control at the 'No Mens'site (Site 1).

Results

Site	Lead Monitor/s	Dates	Method*	Result
Mission Bay	Johnson	May 26, 2005 May 27, 2005	Line Intercept (Sites 1 and 6); Census (Sites 2,3 and 5)	14,557 Plants

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

The Mission Bay *L. nuttallianus* population count was much higher in 2005 than in any other year of monitoring to date. Some previous years' surveys included areas that are no longer quantitatively monitored (e.g., the Least Tern nesting site). Table 1 shows *L. nuttallianus* populations in Mission Bay from 2000-2005; however, sites that have not consistently been quantitatively monitored have been excluded from the total counts in order to compare populations from year to year.

Table 2. Mission Bay *L. nuttallianus* populations, 2000-2005.

	2000	**2001**	**2002**	**2003**	**2004**	**2005**
Estimated *L. nuttallianus* Population*	238	683	210	5,393	375	14,557

* Note that these numbers differ from previous summary reports as they exclude subpopulations which have not been consistently monitored quantitatively.

At the 'Hospitality Point' Rip-Rap site (Site 3), the population appears to extend beyond the previously mapped western boundary. Due to time constraints, this area could not be monitored; however, the population boundary should be mapped in future years, and an alternative monitoring method may need to be devised in high rainfall years due to high plant counts.

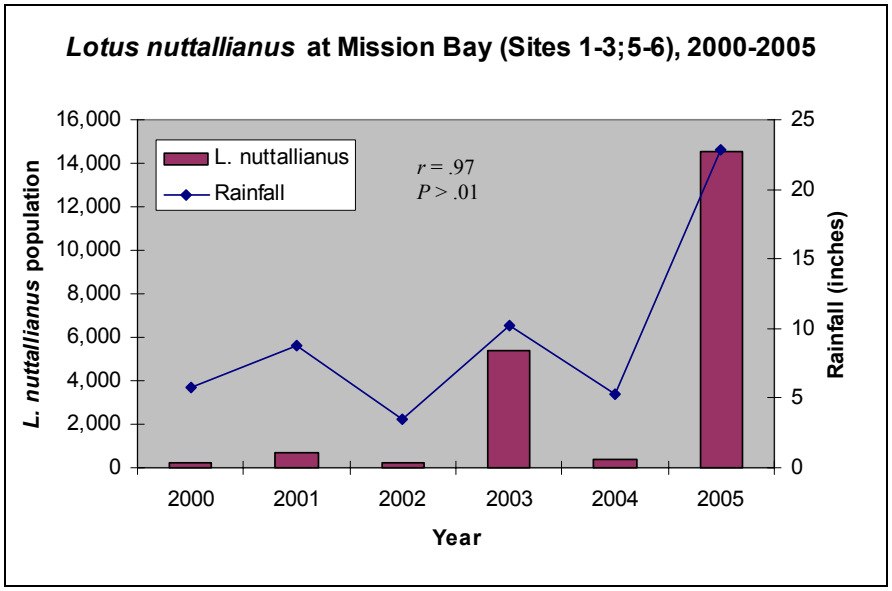
In December, 2004, 30 volunteers hand removed nearly 0.25 acre of *Carpobrotus edulis* (Highway Iceplant) weighing approximately 3.5 tons from the 'No Mens' site (Site 1). However, this was a very small portion of iceplant on-site, and approximately six acres of Iceplant remain. A six-month follow-up to the removal was performed in May, 2005. A 5%

regrowth of iceplant and 4% cover of Nuttall's Lotus was observed in cleared areas. There were also 175 small Iceplant sprouts (likely resprouts) in the cleared areas. Thus, hand removal at this site appears to be inadeqate to effectively control the Iceplant problem.

Analysis

Plant populations from sites that have been quantitatively monitored from 2000-2005 were examined and correlated with water year rainfall using Microsoft Excel. *L. nuttallianus* exhibits a very strong positive correlation with rainfall (Figure 1).

Figure 11. *Lotus nuttallianus* at Continuously Monitored Mission Bay Sites and Annual Rainfall, 2000-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Issues

Carpobrotus edulis continues to be a significant problem at both the 'No Mens' and 'South Shores' sites (Sites 1 and 6), as do *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover) which are also present throughout both sites. In some cases, up to 75% transects were covered by Highway Iceplant (South Shores, Transects #4-7).

At the 'No Mens' site, *Hirschfeldia incana* (Short-Pod Mustard), *Acacia* sp., *Cortaderia* sp. (Pampas Grass) and *Nicotiana glauca* (Tree Tobacco) are also problem species. At the 'South Shores' site., *Mesembryanthemum crystallinum* (Crystalline Iceplant) and *Limonium perezii* (Perez's Marsh-Rosemary; Seafoam Statice) are abundant in many areas.

At the 'Hospitality Point' site (Site 2), weed cover is relatively low as a result of volunteer control efforts at this site; however, there is some *Melilotus alba* (White Sweetclover),

Chrysanthemum coronarium (Garland Daisy) and non-native grasses (primarily *Bromus* sp.) present at the site, though in very low densities/cover.

At the 'Hospitality Point Rip-Rap' site (Site 3), there is considerable cover of *Penisetum* sp. (possibly both *P. setaceum* and *P. villosum*) , especially at the eastern end (approximately 60-70%). Additionally, Sisymbrium sp., *Chrysanthemum coronarium* (Garland Daisy), and *Avena barbata* (Slender Wild Oat) are present at this site in lower densities (approximately 25, 15, and two percent cover, respectively). Additionally, considerable amounts of dog feces were noted in the *L. nuttallianus* habitat, likely from the pathway and parking lots located at the top of the rip-rap population area.

Management Recommendations

No Mens (Site 1)

Carpobrotus edulis (Highway Iceplant), *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover) and *Acacia* sp., *Hirschfeldia incana* (Short-Pod Mustard), *Cortaderia* sp. (Pampas Grass) and *Nicotiana glauca* (Tree Tobacco) should be controlled at the site.

South Shores (Site 6)

Carpobrotus edulis (Highway Iceplant), *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover), *Mesembryanthemum crystallinum* (Crystalline Iceplant) and *Limonium perezii* (Perez's Marsh-Rosemary; Seafoam Statice) should be controlled at the site.

Hospitality Point (Site 2)

Invasives at this site should continue to be controlled.

Hospitality Point Rip-Rap (Site 3)

Pennisetum sp., *Sisymbrium* sp., *Chrysanthemum coronarium* (Garland Daisy), and *Avena barbata* (Slender Wild Oat) should be controlled. Additionally, the City's policies regarding dog-leashing should be enforced in this area, and installation of dog waste bags/cans should be pursued.

No Mens (Site 1), May 26, 2005

Transect 2, facing south

Transect 3, facing south

Transect 4, facing south

Transect 5, facing south

Transect 6, facing south

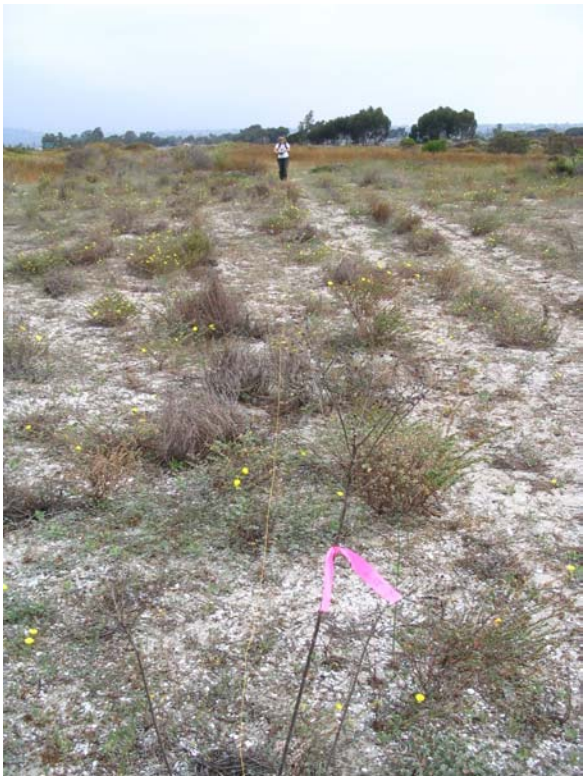
Transect 7, facing north

Transect 8, facing south

Transect 9, facing south

Transect 10, facing south

Transect 11, facing south



Transect 11, facing north

Hospitality Point (Site 2), May 27, 2005

Panorama of monitoring site from southeast corner, facing west, northwest, and north (photos merged using Canon PhotoStitch, v.3.1).

Panorama of monitoring site, from southwest corner, facing north, northeast, east (photos merged using Canon PhotoStitch, v.3.1).

Hospitality Point Rip-Rap (Site 3), May 27, 2005

Rip-rap site from east end, with invasive *Penisetum* sp. in forefront

View of site, facing west, from approximately the midle of the site

South Shores (Site 6), May 26, 2005

Transect 2, facing north

Transect 4, facing north

Transect 5, facing south

Transect 6, facing north

Transect 7, facing north

Transect 8, facing south

Transect 10, facing south

Monardella viminea (Willowy Monardella) and *M. stoneana* (Jennifer's Monardella)

Introduction

The MSCP Biological Monitoring Plan (1996) does not specify any Monardella (*Monardella viminea* and *M. stoneana, previously M. linoides* ssp. *viminea*) monitoring locations within the City of San Diego; however, several sites have been monitored due to the rarity of this species. The Marron Valley site was recommended for monitoring in the Conservation Biology Institute draft monitoring plan revision and has been informally adopted as a City monitoring site. Other sites monitored include Lopez Canyon in the Mira Mesa community area of San Diego, and Sycamore Canyon, which is at the northeastern corner of the City and immediately west of the County of San Diego's Sycamore Canyon/Goodan Ranch Park.

Results

Site	Lead Monitor/s	Date	Method*	Result
Lopez Canyon	Johnson	June 7, 2005	Census	7 points + 900 Plantings**
Marron Valley	Greer/Johnson	June 16, 2005	Census	82 points/102 Plants
Sycamore Canyon	Greer/Miller	June 10, 2005	Census	51 points/99 Plants

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

** Lopez Canyon Willowy Monardella plantings were installed by California Native Plant Society (CNPS) volunteers; seeds were collected and grown by Recon Consulting pursuant to a federal grant to CNPS.

Analysis

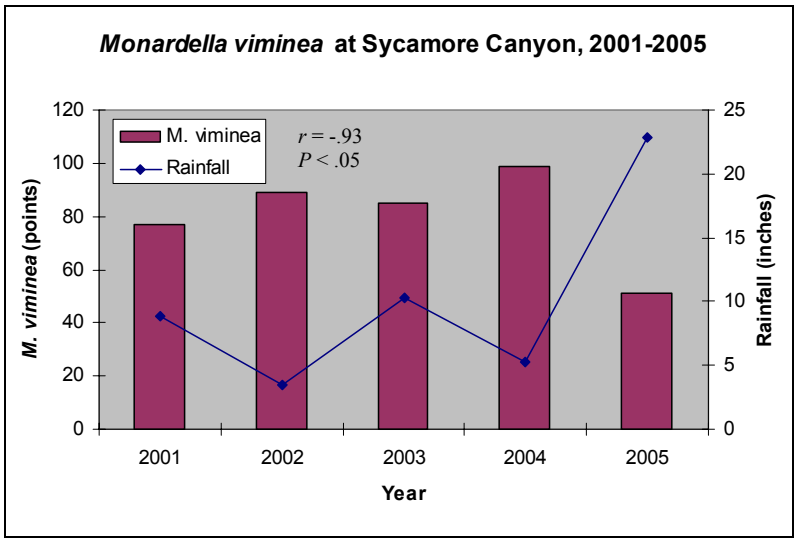
Sycamore Canyon and Marron Valley plant populations, two of the larger populations monitored, were examined and correlated with water year rainfall using Microsoft Excel. GPS point counts were used rather than plant estimates; thus, the numbers do not necessarily represent actual population numbers, but represent the number of small areas (points) that consist of one plant or multiple clumped plants. Interestingly, the Sycamore Canyon population exhibits a negative correlation with rainfall (r = -0.93; $P < 0.05$; Figure 1).

The negative correlation at Sycamore Canyon may be a result of increased erosion in high rainfall years. It was noted during 2005 spring surveys that several areas that were previously occupied had been washed away in the heavy winter rains. Another potential explanation is increased competition from non-native species in heavier rainfall years.

The Marron Valley site does not exhibit any correlation, positive or negative (r = 0.01; $P > 0.05$). The Marron population has been relatively steady and may have had a slight increase over the past several years, with point counts of 42, 66, 86, 83, 113, and 82 in 2000-2005, respectively. However, it should be noted that implementation of the current monitoring method may have been inconsistent from season to season. Monitoring of this species is being analyzed and methods may be revised in order to provide more reliable data.

The Lopez Canyon population has been relatively stable since monitoring began in 2000, with point counts of five, eight, eight, eight, 82 and seven in 2000-2005, respectively. It is believed that the 2004 count of 82 was an aberration and was a stem count rather than a point count, as the species is prone to have underground stems that can be mistaken for seedlings.

Figure 12. *Monardella viminea* at Sycamore Canyon and Annual Rainfall, 2001-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Recommendations

Lopez Canyon

Non-natives such as *Chrysanthemum coronarium* (Garland/Crown Daisy) and non-native grasses should be controlled around the Monardella populations.

Marron Valley

The Marron Valley population has occasional small batches of non-native grasses, which should be controlled.

Sycamore Canyon

Non-native species, especially non-native grasses such as *Bromus diandrus* (Ripgut Brome), *Avena barbata* (Slender Wild Oat) and *Lolium* sp. (Ryegrass), should be controlled as soon as possible.

Marron Valley, June 16, 2005

View of stream area, facing east

Monardella stoneana

Sycamore Canyon/Goodan Ranch, June 10, 2005

View of stream area, facing west

Monardella viminea, surrounded by non-native grasses

Muilla clevelandii (San Diego Goldenstar)

Introduction

The MSCP Biological Monitoring Plan (1996) specifies East Elliot and Del Mar Mesa as *Muilla clevelandii* (San Diego Golden-Stars*)* monitoring locations within the City of San Diego. Much of East Elliot has not yet been preserved; the *M. clevelandii* in this area will be monitored once acquisition is complete or nearly complete. The Otay Lakes population has been monitored since 2001 when it was identified via City-wide rare plant surveys as one of the largest populations on City land.

Results

Site	Lead Monitor/s	Date	Method*	Result
Otay Lakes	Greer/Johnson	April 7, 2005 April 26, 2005	Belt Transect, GPS	Density = 11.59/m² Est Pop = 3,904,505

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

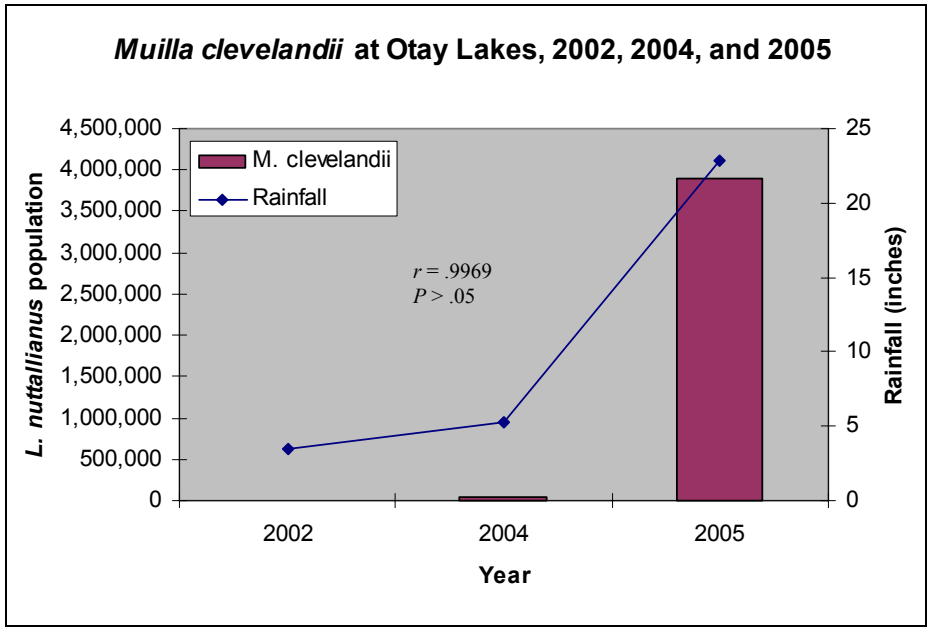
Analysis

The Otay Lakes Golden-Star populations from 2002, 2004 and 2005 were examined and correlated with water year rainfall using Microsoft Excel. The population appears to be affected by rainfall levels, however, the correlation was not statistically significant ($r = 0.99969$, $p > 0.05$; Figure 1). Because there were only three observation years that could be included in the analysis, the test had only one degree of freedom, thus the r value, or correlation, would have had to have been *over* 99 percent (.999) to prove statistically significant. Thus, analyses with more data points (years) would be likely to show a statistically significant positive correlation.

Management Recommendations

The Otay Lakes *Muilla clevelandii* population and surrounding habitat is in relatively good condition, but does have some non-native species within the population, primarily non-native grasses such as *Bromus madritensis* ssp *rubens*, *Bromus hordeaceus*, and *Avena barbata*. Other non-natives in the area include *Centaurea melitensis* and *Sonchus oleraceus*. All of these should be controlled in the area. A proposal has been submitted through the Transnet EMP Funding program for vernal pool management throughout the City and would include dethatching around the Otay Lakes vernal pools, which would include the *Muilla clevelandii* population area.

Figure 13. *Muilla clevelandii* at Otay Lakes and Annual Rainfall, 2002, 2004 and 2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Otay Lakes, April 7, 2005

Overview of *Muilla clevelandii* habitat/monitoring area, facing north

Muilla clevelandii intermixed with *Sisyrinchium bellum* and grasses, facing northwest

Acknowledgments

The following staff assisted in the preparation of this report:

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Keith Greer, Deputy Planning Director
Kristin Syverson, MSCP Intern

City of San Diego MSCP Rare Plant Monitoring:
2005 Dates, Staff and Notes

Appendix A

Species	Site	2005 Survey	Staff	Monitoring Method/Comments	Monitoring Time Notes from Site
Muilla clevelandii (San Diego Goldenstar)	Otay Lakes	7-Apr	K. Greer, M. Johnson, J. Garcia, J. Atha, L. Hierl	Belt transects (partial due to high abundance) and quadrats chosen on GPS in field / Full Long Day	4/7/05 Fairly good timing--very slightly early (lots of flower buds). Surrounding Deinandra fasciculata not yet fully flowering.
		26-Apr	M. Johnson; J. Garcia	Follow up quadrats along belt transects per K. McEachern; GPS'd partial population boundary / Full Day	4/26/05 Fairly good timing; near end of blooming, many flowers fruiting
Brodiaea orcuttii (Orcutt's Brodiaea)	Carroll Canyon	28-Apr	1) K. Greer; 2) M. Johnson; 3) J. Garcia; 4) L. Hierl	Points; Perm Plots / Half Day	4/28/05 good monitoring timing, most plants w/ some flowers, relatively easy to locate
	General Dynamics	28-Apr	Plots: 1) K. Greer; 2) M. Johnson; 3) J. Garcia; 4) L. Hierl 4/29, GPS : 1) M. Johnson, 2) B. Miller, 3) K. Syverson	Perm Plots (1/2 Day); GPS population boundary (2 Hours)	4/28/05 good monitoring timing, most plants w/ some flowers, relatively easy to locate
	Nobel Drive	29-Apr	1) M. Johnson; 2) K. Syverson; 3) B. Miller; 4) C. Frogner	Census and GPS Population / 2 Hours	4/29/05 good monitoring timing, most plants w/ some flowers, relatively easy to locate [4/8/05 notes- Leaves up, bud just emerged at base of plnt]
Acanthomintha illicifolia (San Diego Thorn-mint)	Mission Trails Regional Park	20-Apr	M. Kelly		
	Black Mountain	16-Apr	M. Kelly and Joel ?		
	Sabre Springs	April	M. Kelly and M. Howe		Per 4/13 email: Only 13 plants. Possible snail problem?
	Penasquitos Cyn	13-Apr	Mike Kelly and I. Cooper		Per 4/13 email: Counted 2,091 plants, 4 times as much as last year
Cylindropuntia californica (Snake Cholla)	Otay Mesa	19-Apr	1) M. Johnson; 2) K. Greer; 3) K. McEachern	Presenc/Absence, noted conditions / 1-2 Hours	4/19/05 Plants not fully flowering (buds beginning)
	Spring Canyon	19-Apr	1) M. Johnson; 2) K. Greer; 3) K. McEachern	Presence/Absence, noted conditions / 1-2 Hours	

Species	Site	2005 Survey	Staff	Monitoring Method/Comments	Monitoring Time Notes from Site
Dudleya brevifolia (Short-Leaf Dudleya)	Carmel Mountain	19-May	1) K. Greer; 2) M. Johnson; 3) B. Miller; 4) Randy Rodriguez; 5) Mike Klein	Quadrat; 1/2 Day	5/19/05 good monitoring time, most plants in flower
	Crest Canyon	19-May	1) M. Johnson; 2) B. Miller; 3) M. Klein; 4) J. Garcia	Census, GPS Presence/Absence/Threats	5/19/05 good monitoring time, most plants in flower
	Skeleton Canyon	19-May	1) M. Johnson; 2) B. Miller; 3) M. Klein; 4) J. Garcia	Monitoring (GPS problem, or would have mapped)	5/19/05 good monitoring time, most plants in flower
Dudleya variegata (Variegated Dudleya)	Marron Valley	12-Apr	1) M. Johnson; 2) B. Miller; 3) J. Atha; 4) C. Cibit	Census, ~Full day	4/12/05 Fairly good timing, many plants flowering, but a number in bud only
	Mission Trails Regional Park		M. Kelly and MTRP Docents	~Full day	
	Santa Luz/Blk		M. Kelly		
	Penasquitos Cyn*		M. Kelly		
	Otay Lakes	12-May	1) M. Johnson; 2) B. Miller; 3) R. Rodriguez; 4) C. Kinkade	Full day, Belt Transects	5/12/05 Good timing Plants 70%+ flowering, some buds; 6/2/05 was a little late, plants beginning to dry, somewhat difficult to locate [Visited 4/7/05; No plants up at all; 4/19 and 4/26, plants up, little to no flowering]
		2-Jun	1) M. Johnson; 2) B. Miller; 3) J. Garcia; 4) C. Kinkade; 5) K. Syverson; 6) C. Cibit (a.m. only)	8 a.m. to 3 p.m.	
Lotus nuttallianus (Nuttall's lotus)	Mission Bay	26-May	1) M. Johnson; 2) B. Miller; 3) K. Syverson; 4) L. Hierl (a.m.); 5) M. Shimada (a.m)	Sites 1 and 6, 9 a.m. to 5 p.m.	5/26-27/05 was good monitoring timing, almost all plants flowering, none dried/senescing
		27-May	M. Johnson; K. Syverson	Sites 3 and 2, 9 a.m. to 3:30 p.m.;	
Deinandra conjugens (Otay Tarplant)	Proctor Valley	9-Jun	1) M. Johnson; 2) L. Hierl; 3) K. Syverson; 4) J. Atha	Belt transects; 8 a.m. - 4 p.m.	6/9/05 Good monitoring timing, plants in flower, easy to locate. Note that western slope sub-pop not included in belts

City of San Diego MSCP Rare Plant Monitoring:
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Appendix A

Species	Site	2005 Survey	Staff	Monitoring Method/Comments	Monitoring Time Notes from Site
Monardella viminea (Willowy Monardella)	Lopez Canyon	7-Jun	1) M. Johnson; 2) J. Garcia	Census, 8:30- 12:30	6/7/05 Suboptimal timing- most plants small, not yet flowering
	Marron Valley	16-Jun	1) K. Greer; 2) M. Johnson; 3) Cindy Kinkade; 4) K. Syverson	Census, Full day	6/16/05 Good timing, nearly all plants in flower, relatively easy to locate
	Sycamore Canyon/Goodan Ranch	10-Jun	1) K. Greer; 2) B. Miller; 3) K. Syverson	Census, ~Full day	
Cordylanthus orcuttianus (Orcutt's Bird's Beak)	Otay River Valley	30-Jun	1) M. Johnson; 2) L. Hierl; 3) K. Syverson; 4) J. Garcia; 5) C. Ford	Four 1x3 m plots, GPS all pops; 6.5 Hours	6/30/05 Good timing, plants nearly 100% flowering, relatively easy to locate
Lessingia filaginifolia var. *linifolia* (Del Mar Sand Aster)	Carmel Mtn, Torrey Highlands	21-Jul	1) M. Johnson; 2) J. Garcia; 4) K. Syverson; 5) C. Ford	Census, Full long day	7/21/05 Good timing, plants nearly 100% flowering: prob of previous years survey area not be delineated-- are new areas new or just weren't surveyed previously?
	Overlook Park (San Dieguito River Bluffs)	29-Jul	1) M. Johnson; 2) J. Garcia; 3) R. Rodriguez; 4) K. Syverson; 5) C. Ford	Partial Census, ~3/4 day	7/29/05 Slightly past optimal timing; many flowers going to seed, which made them slightly more difficult to detect
Ambrosia pumila (San Diego Ragweed)	Mission Trails Regional Park	14-Jul	1) M. Johnson; 2) B. Miller; 3) K. Syverson; 4) C. Ford; 5) F. Kramer	Presence/Absence, some mapping/ Half day	7/14/05 Approx 1/4 to 1/2 of population already fruited and drying; difficult to locate amid drying grasses, etc. [possibly earlier than normal due to early rains in 2004-2005 season?]

Date Color Code:
Lt Green = Slightly Early; Dark Green = Good Timing; Orange = Slightly Late; Red = Too Late to Survey

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